

## Forces

### Notes

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**Learning Objective:** Through speaking and writing, SWBAT describe the forces of friction and gravity using academic language.

### **Force**

a push or pull on an object

A force changes an object's motion



**PUSH**



**PULL**

### **Friction**

a force that acts against a motion

Friction causes moving objects to slow down and stop

It occurs when surfaces rub against each other

The force of friction acts in the opposite direction of the motion

Rough surfaces

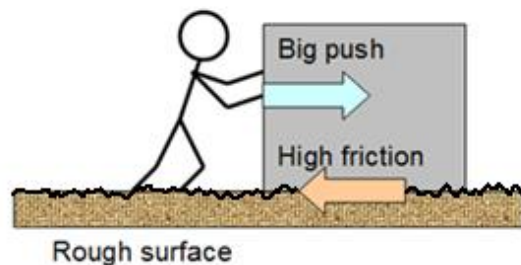
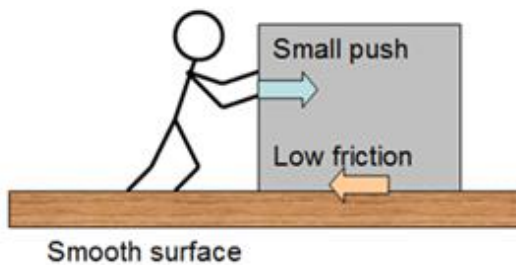
when rough surfaces rub against each other, there is a lot of friction

More force is needed to move an object

Smooth surfaces

when smooth surfaces rub against each other, there is less friction

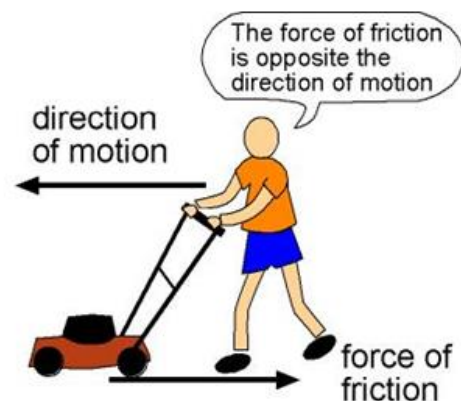
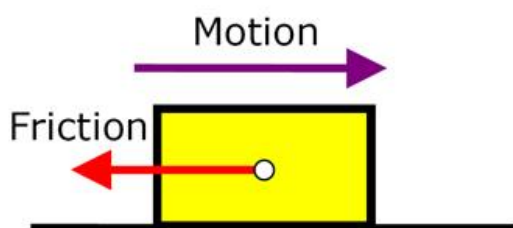
Less force is needed to move an object

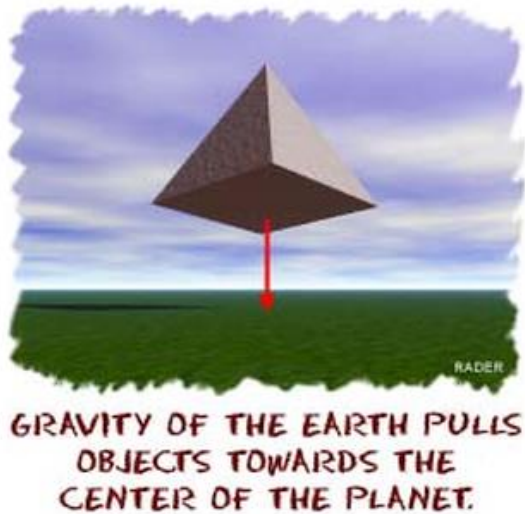


<http://www.brainpop.com/science/motionsforcesandtime/force/>

## Gravity

a force of attraction between all objects





Earth's gravity pulls us toward the ground

The sun's gravity pulls on all the planets and keeps the planets in their orbits

<http://www.brainpop.com/science/motionsforcesandtime/gravity/>

## Forces

### Check Your Understanding

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1. Name two examples of friction from the pictures.

*Two examples of friction from the pictures are \_\_\_\_\_ and \_\_\_\_\_ .*

2. Why do skateboarders go fast down hills?

*Skateboarders go fast down hills because \_\_\_\_\_ .*

3. What is a force?

*A force is \_\_\_\_\_ .*

4. What forces affect a soccer ball when you kick it down a hill? How does each force affect the ball?

*When you kick a soccer ball down a hill, the force of \_\_\_\_\_ . Then the force of \_\_\_\_\_ .*

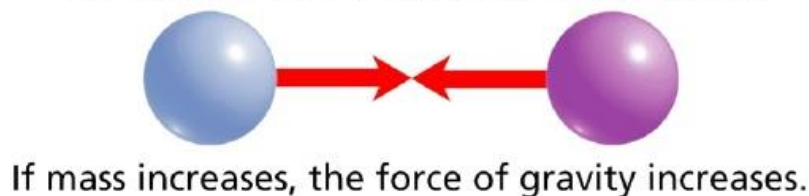
**Learning Objective: Through speaking and writing, SWBAT explain the effects of mass and distance between objects on the force of gravity, using academic language.**

Factors that affect the force of gravity

- mass
- distance between objects

Mass and gravity

objects with more mass have more gravity



Objects with less mass have less gravity

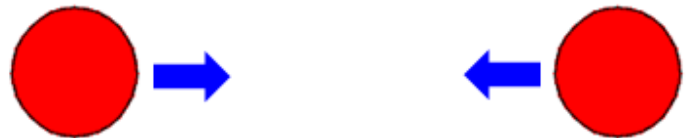
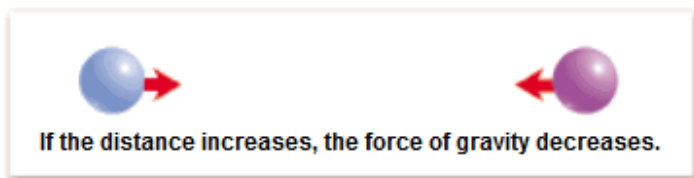
Earth

has more mass than the moon

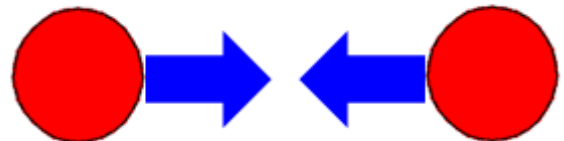
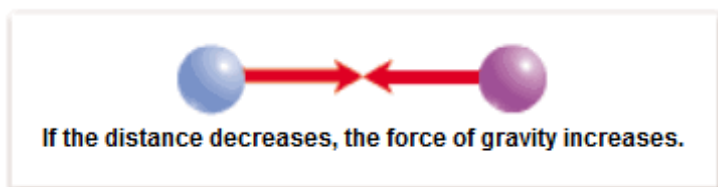
→ Earth has about six times more gravity than the moon

Distance and gravity

the force of gravity decreases as the objects move further apart



The force of gravity increases as the objects move closer together



**Weight**

the measure of the pull of gravity



Newton

unit of measurement for weight



## Forces

### Science Skill

#### Using Numbers to Compare

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1. On which planet is a person's weight closest to what it is on Earth?

*A person's weight is closest to what it is on Earth on the planet \_\_\_\_\_.*

2. Which planet has the greatest gravity?

*The planet \_\_\_\_\_ has the greatest gravity.*

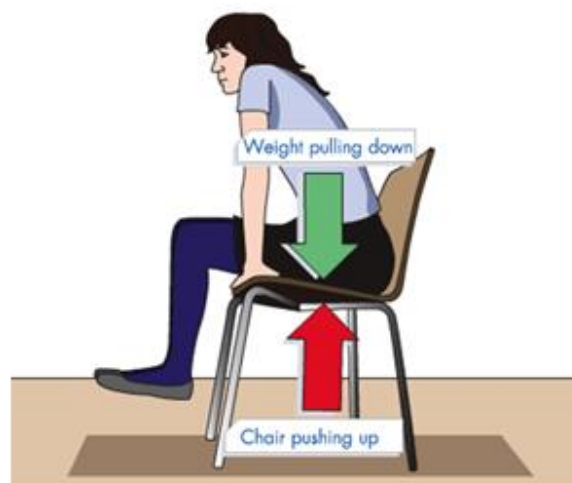
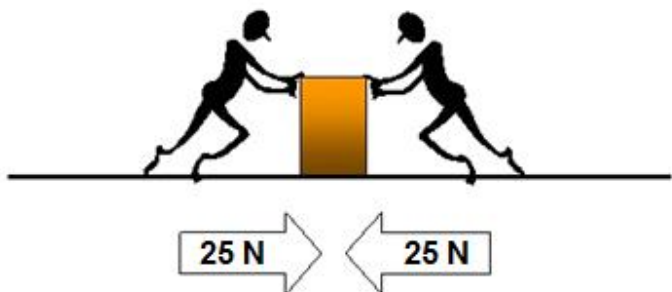
3. What planet has the least mass?

*The planet \_\_\_\_\_ has the least mass.*

**Learning Objective:** Through speaking and writing, SWBAT compare and contrast balanced and unbalanced forces, and relate them to equilibrium, using academic language.

### **Balanced forces**

forces that are equal in size and opposite in direction



Balanced forces do not change an object's motion

### **Equilibrium**

when forces acting on an object are balanced

The object's motion does not change



The rope will not move because there is the same force on both sides!!!

### **Unbalanced forces**

forces that cause change in the motion of an object

When unbalanced forces act on an object, the object can:

- speed up
- slow down
- change direction





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### Check Your Understanding

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1. What force keeps the planets in their orbits?

*The force that keeps planets in their orbits is \_\_\_\_\_ .*

2. What does friction do?

*Friction is \_\_\_\_\_ by causing \_\_\_\_\_ .*

3. What happens when the forces acting on an object are unbalanced?

*When the forces acting on an object are unbalanced, they \_\_\_\_\_ .*

4. Are the forces balanced or unbalanced? How do you know?

*The forces are \_\_\_\_\_ , because \_\_\_\_\_ .*